

**REMARKS**

Claims 1-3 are pending in this application, of which claims 1-2 have been amended. No new claims have been added.

The drawings have been corrected to provide consistency with the amendments to the specification. If approved, these proposed drawing corrections will be incorporated into formal drawings to be filed prior to payment of the Issue Fee.

The title has been corrected to be more descriptive of the claim invention.

Claim 1 stands rejected under 35 U.S.C. §102(b) as anticipated by U.S. Patent 5,063,901 to Kaneyasu et al (hereafter "**Kaneyasu et al.**").

Applicants respectfully traverse this rejection.

**Kaneyasu et al.** discloses a diagnosis system and an optimum control unit for an internal combustion engine. The basic concept of the present invention resides in that a random retrieved signal of which auto correlation function is an impulse shape is superposed on a signal of an internal combustion engine, said superposed signal is used to measure a change of an operation state of the internal combustion engine, and an optimum direction of a control value is detected by a correlation between said measured value and retrieved signal. This method includes the steps of superposing a search signal for fine adjusting a fuel flow quantity value and an ignition timing on a fuel flow quantity signal and an ignition timing signal respectively, applying the fuel flow quantity signal and the ignition timing signal superposed with said search signal respectively to the internal combustion engine, detecting a value of a parameter showing a revolution number or an operation state of the internal combustion engine in response to the superposed signals, detecting a correlation between

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the detected value and the search signal, and carrying out diagnosis or control of the internal combustion engine based on the detected correlation.

Applicants fail to see how Kaneyasu et al. relates to an engine generator apparatus because there is no disclosure of an engine-driven generator, to which the claims of the instant application are directed. Furthermore, the Examiner has argued that element (6) in Kaneyasu et al. is a fault detecting means.

Applicants respectfully disagree. Element 6 in Kaneyasu et al. is a crank angle sensor.

Thus, none of the following elements of claim 1 are disclosed in Kaneyasu et al.:

1. the means for interconnecting the output of the power generation with the power network when the oxygen density sensor is in its actuated state;
2. the means for canceling the interconnection with the power network when the fault detecting means detects a fault, and resuming the interconnection with the power network when the fault is removed; and
3. the means for stopping the engine when the interconnection is canceled for a predetermined length of time due to the fault detection.

Thus, the 35 USC §102(b) rejection should be withdrawn.

Claims 2 and 3 stand rejected under 35 U.S.C. §103(a) as unpatentable on Kaneyasu et al. in view of U.S. Patent 4,873,840 to Gilliusson (hereafter "Gilliusson").

Applicants respectfully traverse this rejection.

Gilliusson discloses a co-generation system for producing electricity, heating and cooling

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and including a combustion unit, a boiler connected to the combustion unit, a steam engine and an electrical generator driven to the steam engine. A condenser is connected to the steam exhaust port of the steam engine, the condenser supplying heat to a heat system and causing condensation of the steam discharged by the exhaust port. An absorption cooler is connected to the exhaust port of the steam engine, the absorption cooler for cooling fluid of a cooling system. A heat pump or centrifugal cooler can also be driven by the output shaft of the steam engine. The co-generation system can also include a flue gas cooler for further transfer of heat to heating system.

As the Examiner has admitted, Gilliusson fails to disclose an engine generator apparatus, to which the claims of the instant application as directed.

Thus, the 35 USC §103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 1-3, as amended, are in condition for allowance, which action, at an early date, is requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

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Respectfully submitted,

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PATENT TRADEMARK OFFICE

Enclosures:

Version with markings to show changes made  
Request for Approval of Drawing Corrections w/ Figs. 1, 3, 4, 5, and 7  
marked in red ink  
Substitute Abstract of the Disclosure

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**IN THE TITLE:**

Amend the title as follows:

GRID-TYPE ENGINE GENERATOR APPARATUS [AND COGENERATION  
SYSTEM] FOR CONNECTING AN OUTPUT OF AN ENGINE-DRIVEN GENERATOR TO  
A POWER NETWORK

**IN THE ABSTRACT:**

Amend the Abstract as follows:

[This] A grid-type engine generator apparatus which can prevent [declination] reduction in the operational efficiency due to the stop motion of an engine at the cancellation of the interconnection and minimize loads exerted on the startup device for the engine. A [system] network protector [138] is provided for generating a fault signal when detecting a fault on the [system] network source. Upon receiving the fault signal, an interconnection relay [135] is opened to cancel the interconnection and simultaneously, a timer [39] is started. The cancellation permits the engine [11] to run with no load. When the fault signal is maintained until the setting duration of the timer [39] is timed up, a time-out signal is released to stop the engine [11]. On the other hand, when the fault signal is eliminated by canceling the cause of the fault before the setting duration of the timer [39] is passed, the interconnection relay [135] is closed to establish the interconnection again and the timer [39] is reset.

**IN THE SPECIFICATION:**

Amend the specification as follows:

Paragraph beginning at page 1, line 5 has been amended as follows:

The present invention relates to an engine generator apparatus and a cogeneration system and more particularly, to an engine generator apparatus [having a function for] interconnecting with an electric power [system] network or grid for private use generator or a small-sized cogeneration facility and a cogeneration system including the engine generator apparatus.

Paragraph beginning at page 1, line 13 has been amended as follows:

Generator apparatuses for private use have widely been provided for emergency use in case of blackout or power failure. Recently, private use cogeneration type generator apparatuses which can be interconnected with electric power [systems] networks for improvement of the efficiency of operation are getting popular. Such a cogeneration type private use generator apparatus comprises a small generator driven by a gasoline engine or a gas engine fueled with gas fuel such as town gas.

Paragraph beginning at page 1, line 22 has been amended as follows:

For smooth interconnection with an electric power [system] network, the cogeneration type generator apparatus needs to comply with the guideline for technical requirements for interconnection (issued by the Ministry of Trade) which stipulates technical standards including a

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range of outputs of applicable power [systems] networks and protections for the power [system] network in case of a ground fault or short-circuit. It is [hence] necessary to cancel the interconnection with the [system] network when the operation fails to comply with the requirements of the guideline as is regarded as a fault. As the operation has been reset to comply with the requirements of the guideline, the interconnection to the power [system] network can be re-established.

Paragraph beginning at page 2, line 17 has been amended as follows:

When the cogeneration system having such an exhaust gas purifying apparatus encounters a fault during its operation, it cancels the interconnection with the power [system] network and then stops the engine, [hence] thereby producing the following drawback. For normal operation, the oxygen density sensor needs to have a temperature of substantially 400 °C. At every re-start operation of the engine, a warming up for raising the temperature of the oxygen density sensor from a lower level to the operable level where the sensor is activated is required. The frequent warming up operation causes a declination in the operational efficiency. Particularly, as the engine is stopped upon [temporally] temporary cancellation of the interconnection with the re-interconnection within a short interval of time, the operational efficiency will significantly be declined. Also, if a protection scheme is switched on to stop the engine at every cancellation of the interconnection, it may exert unwanted loads on the startup device or other components.

Paragraph beginning at page 3, line 16 has been amended as follows:

An engine generator apparatus according to the present invention is provided for interconnecting an output of a generator driven by an engine with a power [system] network, comprising, an oxygen density sensor provided on the engine for controlling the air-fuel ratio based on its output, a means for interconnecting the output of the power generator with the power [system] network, when the oxygen density sensor becomes its activated state, a fault detecting means for detecting a fault in the interconnection with the power [system] network, a means for canceling the interconnection with the power [system] network when the fault detecting means detects a fault, and resuming the interconnection with the power [system] network when the fault is removed; and a means for stopping the engine when the interconnection is canceled for a predetermined length of time due to the fault detection.

Paragraph beginning at page 4, line 5 has been amended as follows:

According to the above arrangement, the engine is not stopped but operated with no load even if the interconnection with the power [system] network is canceled, provided that the interval from the cancellation to the re-interconnection is not longer than a particular length of time. The engine stop in response to every cancellation of the interconnection can successfully be eliminated. As a result, a warming up for activating the oxygen density sensor can be carried out at [less] a lower frequency and the exertion of undesired loads on the startup device for the engine can be avoided.

Paragraph beginning at page 5, line 16 has been amended as follows:



One embodiment of the present invention will be described in more detail referring to the relevant drawings. Fig. 1 is a block diagram of the engine generator apparatus. As shown, an engine operated generator 10 comprises an engine 11 and a generator 12. The generator 12 is driven by the engine 11 for generating an alternating current output responding to the number of revolutions. The generator 12 comprises a rotor joined to the engine 11 and a stator on which three phase windings are wound. The output terminal of the three phase windings is connected with an inverter unit 13. The inverter unit 13 converts the alternating current output of the generator 12 into an alternating current of the quality equivalent (in voltage, frequency, noise, and other factors) to that of the commercial power supply, then the output is connected to the commercial power [system] network as timed in phase with the same of the [system] network.

Paragraph beginning at page 6, line 6 has been amended as follows:

More specifically, the inverter unit 13 comprises a converter 131 for converting the alternating current output of the generator 12 into a direct current, an inverter circuit 133 for converting the direct current received from the converter 131 into an alternating current with the frequency and the voltage of the commercial power [system] network, a filter circuit 134, and a connector relay 135. The alternating current output of the inverter unit 13 is connected by the connector relay 135 and a main switch 136 to the commercial power [system] network 14 and also to a domestic electrical load 15 (for example, in a private use power [system] network).

Paragraph beginning at page 6, line 25 has been amended as follows:

The system protector 138 monitors the voltage and frequency of the output of the generator 12 and if the voltage or the frequency is different from the reference level or the failure of the power supply is occurred, generates and supplies an error signal to the inverter controller 137 which in turn open the connector relay 135 thus release the parallel operation to protect the [system] network. Failure in the power supply may be judged from jumping in the phase of the [system] network. Alternatively, while the inverter output is periodically shifted in the phase, the failure may be judged from a degree of phase shift. The inverter controller 137 includes a nonvolatile memory such as an EEPROM for storage of data of the failure and data of the (unusual) stop motion when the failure takes place in the inverter unit 13 or the commercial power [system] network 14.

Paragraph beginning at page 8, line 5 has been amended as follows:

A communications unit 139 is provided between the ECU 38 and a combination (which may be referred to as an inverter side opposite to the ECU side) of the inverter controller 137 and the [system] network protector 138 for communication of each state of both sides. A power source 140 is connected to the output terminal of the inverter unit 13 for supplying power to a drive source and a control source for both the engine generator 10 and the inverter unit 13.

Paragraph beginning at page 10, line 7 has been amended as follows:

It is then examined at Step S3 whether or not a heat request is received or not from a controller (Fig. 5) for detecting the size of thermal load, i.e., the command for starting up the

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engine 11 is received [or not]. The thermal load in the form of a hot-water tank and the controller will be explained later in more detail.

Paragraph beginning at page 10, line 13 has been amended as follows:

When the heat request is received, the procedure goes to Step S6 where it is examined whether or not the engine 11 has a fault. If not, the procedure advances to Step S7 where the communication unit 139 is activated for inquiring of the inverter controller 137 about the state of the inverter unit 13. It is examined from a response from the inverter controller 137 at Step S8 whether or not the inverter unit 13 has a fault [or not]. If the inverter unit has [not] no fault, the procedure goes to Step S9 for starting the engine 11. When the engine 11 is started up, its start is communicated to the inverter controller 137 through the communication unit 139.

Paragraph beginning at page 11, line 8 has been amended as follows:

The process in the inverter controller 137 will now be explained referring to Fig. 3. As the main switch 136 has been turned on, it is examined from the data in the nonvolatile memory at Step S12 whether or not a power failure is detected [or not]. When the power failure is detected, the procedure goes to Step S13 for hesitation or time lag. After the hesitation of a predetermined length of time (e.g., 150 seconds), the procedure goes to Step S14. If no power failure is detected, the procedure jumps to Step S14 from Step S12.

Paragraph beginning at page 12, line 3 has been amended as follows:

It is then examined at Step S14 whether the power [system] network has a fault. If the power [system] network has not fault, the procedure goes to Step S15 where it is examined whether or not the inverter unit 13 now has a fault [or not]. If there is [not a] no fault, the procedure moves to Step S17 for starting the checkup of the generator 12. When the inverter unit 13 has a fault, the procedure goes to Step S18 for storing a memory with a data of "inverter fault" and returns back to Step S14.

Paragraph beginning at page 12, line 12 has been amended as follows:

When it is judged at Step S14 that the power [system] network has a fault, the judgment at Step S14 is maintained until the fault on the power [system] network is eliminated. The data in the nonvolatile memory indicative of the fault of the inverter unit 13 is cleared when the user cancels the usual state and the judgment at Step S5 is affirmative. As a result, the inverter fault is eliminated. This information about the inverter unit 13 is transferred to the ECU 38 side as a response to the requiring at Step S7.

Paragraph beginning at page 12, line 21 has been amended as follows:

It is then examined at Step S19 whether or not the direct current voltage Vdc after the rectification process exceeds a predetermined level (e.g., 380 V) [or not]. When the voltage exceeds the predetermined level, the procedure advances to Step S20 where the connector relay 135 is closed by the signal of "inverter start permission" transmitted at Step S1 for starting the parallel operation with the commercial power [system] network.

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Paragraph beginning at page 13, line 17 has been amended as follows:

On the other hand, when the direct current voltage Vdc is [smaller] less than the predetermined level after increasing the output of the inverter unit 13 with the output which is lower than the rated level ("negative" at Step S23), the procedure moves from Step S22 to Step S24. It is examined at Step S24 whether or not the judgment that the direct current voltage Vdc is not higher than the predetermined level is repeated at a predetermined number of times (e.g., five times). If Step S24 is affirmative, it is judged that the generator 12 has a fault and the parallel operation with the commercial power [system] network is canceled thus stopping the inverter controlling process. If it is judged "not" at Step S24, the procedure goes to Step S25 for canceling the parallel operation. After providing a time lag at Step S26 for the predetermined length of time (150 seconds), the procedure goes back to Step S20 for re-starting of the parallel operation. The procedure may be shifted from Step S26 to Step S19 instead of S20.

Paragraph beginning at page 14, line 9 has been amended as follows:

When it is judged negative at Step S19, the procedure goes to Step S27 where it is examined whether or not the direct current voltage Vdc is below the predetermined level throughout a predetermined length of time (e.g., three minutes). When the generator 12 has a fault, it is judged affirmative at Step S27 or affirmative at Step S24, and the procedure goes to Step S24a. At Step S24a, [store] the nonvolatile memory is stored with the fault of the generator 12 and then the inverter control procedure is terminated.

Paragraph beginning at page 15, line 19 has been amended as follows:

If the fault signal is not received from the inverter unit 13, the procedure goes to Step S38 where it is examined whether or not a signal indicative of power system fault is received or not from the inverter controller 137. When the power [system] network fault signal is not received, the procedure moves to Step S30. When the signal indicative of power system fault is received, the procedure moves to Step S39 for stopping the engine 11 and the procedure returns to Step S3.

Paragraph beginning at page 16, line 2 has been amended as follows:

The process of the inverter controller 13 will now be explained referring to Fig. 5. It is examined at Step S40 whether or not the heat request off is received [or not] from the ECU 38. When the heat request off is received, the connection to the power [system] network is released at Step S41 and the procedure moves back to Step S12 (Fig. 3). When the heat request off is not received, the procedure advances to Step S42 where it is examined whether or not the signal of the engine stop is received [or not]. When signal of the engine stop is received, the parallel operation is released at Step S43 and the procedure returns to Step S12. If the signal of the engine stop is not received, it is examined at Step S44 whether or not the inverter unit 13 has a fault. When the unit 13 has a fault, the procedure goes to Step S45 for releasing the connection to the commercial power [system] network and the procedure moves back to Step S12.

Paragraph beginning at page 16, line 18 has been amended as follows:

If the inverter unit 13 has no fault, it is then examined at Step S46 whether or not the

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power system has a fault [or not]. When the power system has [not a] no fault, the procedure goes to Step S47 where it is examined whether or not the connection or parallel operation is established [or not]. When the parallel operation is established, the procedure returns back to Step S40.

Paragraph beginning at page 16, line 25 has been amended as follows:

When it is judged at Step S46 that the power [system] network has a fault, the procedure goes to Step S51 for releasing the parallel operation of the systems. It is then examined at Step S52 whether or not a power failure occurs [or not]. When the power failure is detected, the nonvolatile memory is stored with the data indicative of the detection of the failure at Step S53. If no power failure is detected, the procedure skips Step S53 and jumps to the Step S54. It is then examined at Step S54 whether or not the power [system] network fault continues throughout a predetermined length of time (e.g. five minutes) [or not]. If Step S54 is negative, the procedure goes to Step S47. When the parallel operation is not established, the procedure advances to Step S48 where it is examined whether or not the power [system] network has a fault [or not]. When the power [system] network has a fault, the procedure moves back to Step S40. If not, the procedure goes to Step S49 for providing a time lag of a predetermined length of time (e.g., 150 seconds) and then to Step S50. At Step S50, the parallel operation is started. When the fault continues over the predetermined length of time, the procedure goes to Step S55 where the command of stopping the engine 11 is transmitted to the ECU 38. It is then examined at Step S56 whether or not the power [system] network has a fault [or not]. When the fault has been

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eliminated, the procedure goes to Step S57 for providing a time lag of a predetermined length of time (e.g., 150 seconds) and then returned to Step S12 (Fig. 3).

Paragraph beginning at page 20, line 10 has been amended as follows:

In response to the temperature information TI, the controller 29 controls the start and stop operation of the engine 11. [Since] Because the temperature information TI represents the demand of heat from the hot water supply unit 21 which draws the hot water directly from the hot water storage tank 17 or from the heating system 24 which draws the hot water indirectly via the second heat exchanger 22, the controller 29 judges that the demand exceeds when the temperature information TI is not higher than a reference level Tref-1 and drives the engine 11 to generate the heat. On the other hand, when the temperature information TI is higher than the reference level Tref-1, the controller 29 judges that a sufficient level of the heat energy is saved in the hot water storage tank 17 and turns the heat request off then stops the engine 11.

Paragraph beginning at page 20, line 25 has been amended as follows:

The reference level Tref-1 of the temperature is determined from multiple parameters of the type and the magnitude of the thermal load (i.e. the type and the capacity of the hot water supply unit 21 and the heating system 24), the thermal output of the engine operated generator 10, the volume of the hot water storage tank 17, and so on. The reference level Tref-1 has a hysteresis for ensuring a stable operation of the engine 11, i.e., avoiding frequent start and stop operations.



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Paragraph beginning at page 21, line 22 has been amended as follows:

The temperature of the hot water in the hot water storage tank 17 is significantly varied depending on the consumption of the hot water, i.e., the demand of thermal energy, and the mode of the operation of the engine operated generator 10, e.g., either the constant output mode or the electrical load dependent mode. For example, in a system where when the consumption of the hot water is low, the temperature of the hot water can be maintained to about 80 °C with the generator 12 operating in response to the temperature detected by the temperature sensor TS1, either abrupt, bulky consumption of the hot water resulting from the demand of heat given simultaneously from both the hot water supply unit 21 and the heating system 24 or the startup of the system may cause the temperature of the hot water in the hot water storage tank 17 to drop down to as a low degree as of the cool water supplied.

Paragraph beginning at page 24, line 17 has been amended as follows:

As set forth above, the features of the present invention [defined in claims 1 to 3] allow the engine to continue its motion even if the interconnection is canceled and resumed within a short interval of time, thus minimizing loads exerted on the startup device. Also, as the warming up for activating the oxygen density sensor which is always carried out after the engine is stopped has to be performed at less frequencies, hence avoiding declination in the operational efficiency.

Paragraph beginning at page 24, line 26 has been amended as follows:

According to the feature of the present invention [defined in claims 2 and 3], the engine is

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started in response to a heat request received from the waste heat utilizing means, thus permitting the waste heat produced during the period before the activation of the oxygen density sensor is completed to be utilized at maximum effectiveness.

**IN THE CLAIMS:**

Please amend claims 1-2 as follows:

1. (Amended) An [Engine] engine generator apparatus for interconnecting an output of a generator driven by an engine with a power [system] network, comprising:

an oxygen density sensor provided on the engine for controlling the air-fuel ration based on its output;

a means for interconnecting the output of the power generator with the power [system,] network when the oxygen density sensor [becomes] is in its activated state;

a fault detecting means for detecting a fault in the interconnection with the power [system] network;

a means for canceling the interconnection with the power [system] network when the fault detecting means detects a fault, and resuming the interconnection with the power [system] network when the fault is removed; and

a means for stopping the engine when the interconnection is canceled for a predetermined length of time due to the fault detection.

2. (Amended) A cogeneration system comprising:

an engine generator apparatus for interconnecting an output of a generator driven by an engine with a power [system] network comprising:

an oxygen density sensor provided on the engine for controlling the air-fuel ratio based on its output;

a means for interconnecting the output of the power generator with the power [system] network when the oxygen density sensor [becomes] is in its activated state;

a fault detecting means for detecting a fault in the interconnection with the power [system] network;

a means for canceling the interconnection with the power [system] network when the fault detecting means detects a fault, and resuming the interconnection with the power [system] network when the fault is removed; [and]

a means for stopping the engine when the interconnection is canceled for a predetermined length of time due to the fault detection[,]; and

a waste heat utilizing unit for utilizing waste heat produced by the operation of the engine generator apparatus, wherein the engine is started in response to a heat request generated by the waste heat utilizing unit.